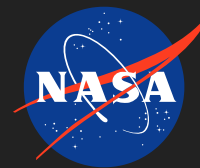


## Purification of Lunar Cold-Trapped Volatiles - FY17

Completed Technology Project (2016 - 2017)



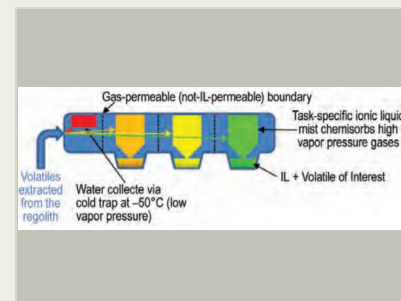
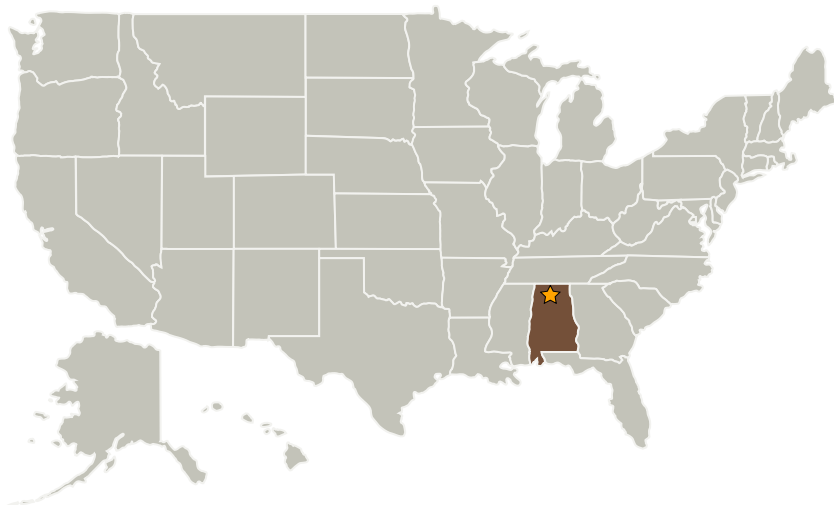
## Project Introduction

The target outcomes of the proposed work are 1) hardware that can separate lunar permanently shadowed region (PSR) volatile species, and 2) four task-specific ILs that can be used with the same mixture of gases, each IL designed to extract a different volatile species from the mixed gas. The work is innovative in that it provides a workable way to separate the PSR volatiles after collection, it produces ILs that can be used in series for obtaining certain volatile species, and it is the first way to reasonably separate extracted volatiles (step-cold trapping of volatiles will not sufficiently separate the PSR volatiles for use). Specific tasks in Year 1:1. To synthesize task-specific ILs that is efficient at removing specific volatile species, while allowing other volatile species to pass through. The following volatiles will be collected with the ILs developed: CO, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>.2. Test each developed IL for efficiency of absorption of the specific gas for which it was developed.

## Anticipated Benefits

Many technologies have been proposed for volatile extraction from permanently shadowed regions (PSRs) of the moon for use as in-situ resources for future missions, but none go beyond collection of mixed volatiles. The proposed work provides a innovative way to separate the PSR volatiles after collection, it produces ionic liquids (ILs) that can be used in series for obtaining certain volatile species, and it is the first way to reasonably separate extracted volatiles.

## Primary U.S. Work Locations and Key Partners

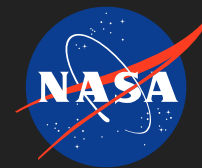


Concept of cascade hardware to separate volatiles extracted from lunar PSRs.

## Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	1
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destination	3

## Purification of Lunar Cold-Trapped Volatiles - FY17



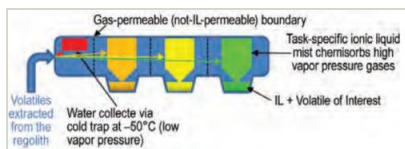
Completed Technology Project (2016 - 2017)

Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center (MSFC)	Lead Organization	NASA Center	Huntsville, Alabama

## Primary U.S. Work Locations

Alabama

## Images



## Project Image

Concept of cascade hardware to separate volatiles extracted from lunar PSRs.

(<https://techport.nasa.gov/image/35793>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Center / Facility:

Marshall Space Flight Center (MSFC)

## Responsible Program:

Center Innovation Fund: MSFC CIF

## Project Management

## Program Director:

Michael R Lapointe

## Program Manager:

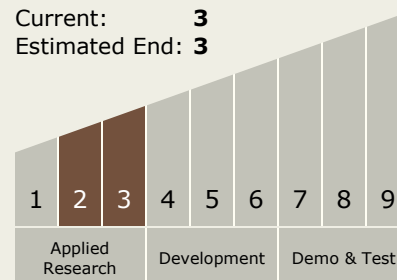
John W Dankanich

## Principal Investigator:

Robert D Woods

## Technology Maturity (TRL)

Start: 2  
Current: 3  
Estimated End: 3



# Purification of Lunar Cold-Trapped Volatiles - FY17

Completed Technology Project (2016 - 2017)



## Technology Areas

### Primary:

- TX07 Exploration Destination Systems
  - └ TX07.1 In-Situ Resource Utilization
    - └ TX07.1.2 Resource Acquisition, Isolation, and Preparation

## Target Destination

The Moon